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Ricky Woofter, Kirsten Brendtro, and John S. Ramsdell

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Ricky Woofter, Kirsten Brendtro, and John S. Ramsdell*

Marine Biotoxins Program, Center for Coastal Environmental Health and Biomolecular Research, NOAA-National Ocean Service, Charleston, South Carolina, USA

Address correspondence to:

John S. Ramsdell, Ph.D.
Chief, Coastal Research Branch
Center for Coastal Environmental Health & Biomolecular Research
NOAA-National Ocean Service
219 Fort Johnson Rd.
Charleston, SC 29412
TEL: 843-762-8510
FAX: 843-762-8700
Email: john.ramsdell@noaa.gov

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Abbreviations used:

RIA: radioimmunoassay (RIA)
EC_{50}: half-maximal effective concentration
IP: intraperitoneal
RBA: receptor binding assay
ELISA: enzyme linked immunosorbent assay
t-1/2: Biological half-life
ppt: parts per thousand

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Abstract

There is a critical need to simply and reliably monitor brevetoxins routinely in the blood of humans and aquatic animals. Striped mullet were used as laboratory test animals to better define the uptake and elimination kinetics of brevetoxin during an aqueous exposure to the brevetoxin producing dinoflagellate, *Karenia brevis*. Striped mullet were first exposed to sublethal densities of *K. brevis* (~250 000 cells/liter) for 1, 4, 8, 12, and 24 hours. There was no mortality observed in the aquaria, and at each time point blood samples were taken and applied to blood collection cards for brevetoxin analysis using radioimmunoassay (RIA). The RIA indicated that blood PbTx-3 levels increased to values significantly different from that of the controls at all five time points during exposure ($p<0.05$). Striped mullet were then exposed to a *K. brevis* culture with a known brevetoxin concentration of 0.5 ng/ml. Even after exposures at a low brevetoxin concentration, the RIA was able to detect 2.25 ± 0.62 ng/ml PbTx-3 equivalents in the blood of the mullet at 8 hours of exposure. When exposed to higher brevetoxin concentrations (3.5 and 5.4 ng/ml), blood brevetoxin increased to peak levels at 12 hr and then reached equilibrium after 24 hr in the continued presence of *K. brevis.* During this time of equilibrium the mullet maintained brevetoxins with a blood:water coefficient of 2.2. To define the elimination of brevetoxin, striped mullet were next exposed for 8-10 hours and then transferred to fresh seawater containing no *K. brevis* for up to 116 hr. Blood brevetoxin levels remained elevated and decreased only by 50% 116 hr after transfer. The rate of elimination fit best to a two-phase exponential decay with t½ of 12 and 266 hr. This study, using RIA in conjunction with blood collection cards, demonstrates an effective means to monitor blood brevetoxin levels in finfish and provides a foundation to characterize biologically relevant levels of brevetoxin in other species impacted by red tide events.